US-PAT-NO: 5132749

DOCUMENT-IDENTIFIER: US 5132749 A

TITLE: Semiconductor device

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Brief Summary Text - BSTX (11):

Especially, the diamond layer doped with some dopants suffers from great amount of lattice defects more heavily than the non-doped diamond layer. Therefore, when a pn junction of diamond layers or a Schottky junction of metal and diamond layers is fabricated to make a diode, a bipolar transistor or field effect transistors, many parasitic surface or interface states occur owing to the highly populated lattice defects. Here, the surface or interface state means an electronic or a hole state at the surface or the interface of the junctions where a lattice defect captures an electron or a hole at a certain energy in the band gap. In an ideal crystal without defects, the band gap defined as the region between the top of the valence band and the bottom of the conduction band has no electronic or hole state. Then the band gap is often called a forbidden band.

	U	L	Document ID	Issue Date	Pages	Tit
72			US 5132749 A	19920721	9	Semiconductor device
73			US 5126277 A	19920630	7	Method of manufacturing a semic resistor
74			US 5115458 A	19920519	10	Reducing dark current in charge
75			US 5094693 A	19920310	6	Doped zinc oxide-based pigment
76			US 5093704 A	19920303	20	Semiconductor device having a s band gap being continuously gra

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United States Patent [19]

Nishibayashi et al.

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[45] Date of Patent: Jul. 21, 1992

[54] SEMICONDUCTOR DEVICE

[75] Inventors: Yoshiki Nishibayashi; Hiromu Shiomi; Masaji Fujimori, all of Hyogo, Japan

[73] Assignee: Sumitomo Electric Industries, Ltd., Osaka, Japan

[21] Appl. No.: 665,593

[22] Filed: Mar. 6, 1991

[30] Foreign Application Priority Data

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Jun. 8, 1990 [JP] Japan 2-150340

[51] Int. Cl.[5] H01L 29/48

[52] U.S. Cl. 357/15; 357/60; 357/61

[58] Field of Search 357/15, 60, 61; 437/175, 176, 180, 187

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Primary Examiner—Georgia Y. Epps

Attorney, Agent, or Firm—Cushman, Darby & Cushman

[57] ABSTRACT

Doping a dopant into a diamond semiconductor causes lattice defects. The pn junction diode or the Schottky junction diode made from diamond has low break down voltage and high reverse leakage current owing to the lattice defects. A non-doped or low doped diamond layer with high resistivity is epitaxially grown between the N-type diamond layer and the p-type diamond layer in the pn junction diode or between the metal layer and the doped diamond layer in the Schottky diode. The intermediate layer heightens the break down voltage and decreases the reverse leakage current.

13 Claims, 3 Drawing Sheets